



Virtual Ants Setup 2009



By The **AntWall** Group

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1.0 Software.

1.1 General technical description of the program.

1.1.1 What it is.

The Virtual Ants program is written in Adobe Action Script 3 using an Object Orientated class structure.

1.1.2 What it does.

The Virtual Ants program incorporates motion detection software interacting with 50 ant images running inside a finite state machine algorithm. The ants behave as normal ants do, going out looking for food and returning back to the nest with it. They also leave a pheromone like trail between the food and their nest. When other ants come across this trail, they follow it to the food, which they take a small portion of back to the nest. The food is also virtual and is projected onto the floor. If a person walks into the ant area then any ants' not carrying food, or heading up the trail towards the food, will come towards that person. If the person stays still for a period of time, the ants will get bored and walk away. The motion detection program will only track one person at a time.

2.0 Hardware Used

2.1 Hardware overview

The Otago Museum purchased all the hardware as follows:

Webcam, computer, projector and cables.

2.1.1 Webcam

A Logitech E2500 webcam for the motion detection, this has an aspect ratio of about 4:3.

2.1.2 Computer

The computer is a Dell Inspiron 525s running Windows Vista Basic, with an Intel E5000 series Core 2 Duo, 3GB ram, ATI graphics card.

2.1.3 Projector

An NEC NP500W widescreen projector with a resolution of 1280 x 800, giving an aspect ratio of 16:9. The resolution of 1280 x 800 is the same resolution we set the graphics card to run at. It is also the same resolution we developed and set the "Virtual Ants" program to run and display at.

3.0 Setup

3.1. Attaching the hardware

Mount the webcam and projector as close together as possible, 3.2m from the floor to the front of the projector, so they view the same area of floor. 3.2m was the height we had to use at the Otago Museum due to a concrete ceiling at the 3.6m height. We taped the webcam to the projector using 3M 4910 VHB double sided tape. The projector was then mounted in a specially made customwood box, with the projector pointing towards the floor. See image below.



3.2 Installing additional software

3.2.1 Webcam drivers.

Install the Logitech E2500 webcam drivers only, if possible, for the webcam. The added software usually supplied with webcams is not needed.

3.2.2 Adobe Flash Player.

Install the latest Flash Player. We used Adobe Flash Player version 10 when we developed the Virtual Ants program and released it to the Otago Museum, June 2009.

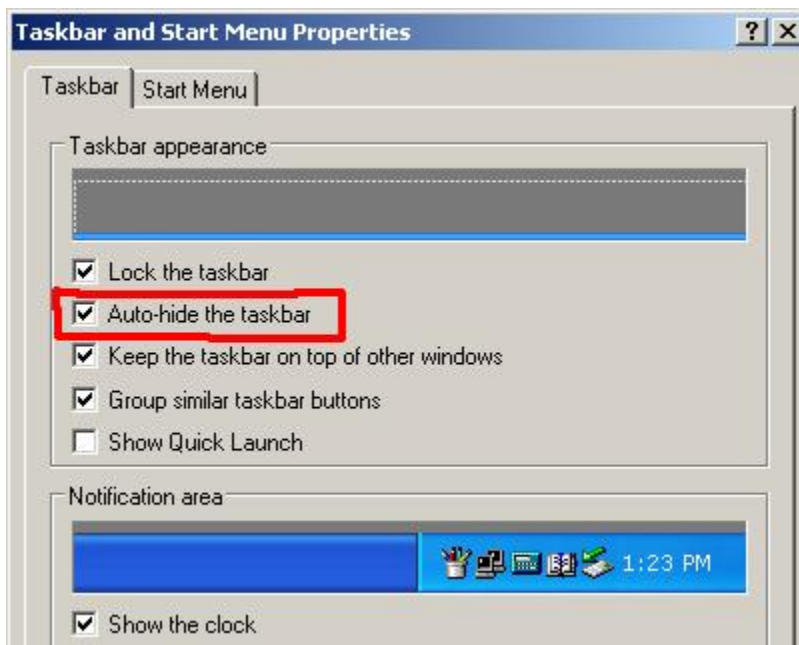
This will need to be setup once the webcam is connected and the “Motion-Tracking setup.swf” program is running. This is in the Webcam Setup Program folder. We will come to this shortly, in section 3.4 Flash Player setup.

3.2.3 Graphics card drivers.

We installed the latest ATI graphics drivers as of June 2009. These had additional resolution setup options, 1280 x 800, that were not available in the standard driver setup supplied by Dell.

3.3 Change some Windows features.

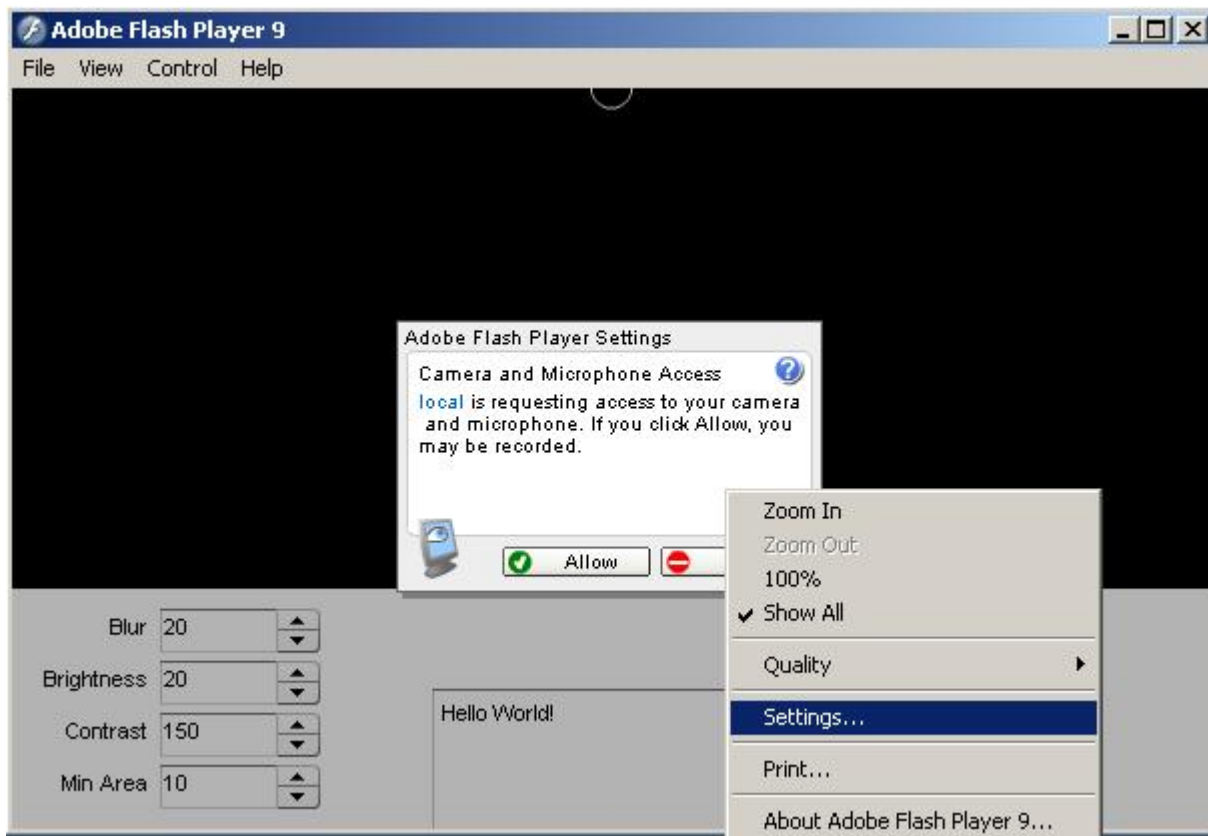
You have to set the Windows Taskbar to Auto Hide. To do this, right click on the Taskbar and select Properties. Check the "Auto-hide the taskbar" box. This will make the Taskbar disappear when the Virtual Ants program is running. See image below.



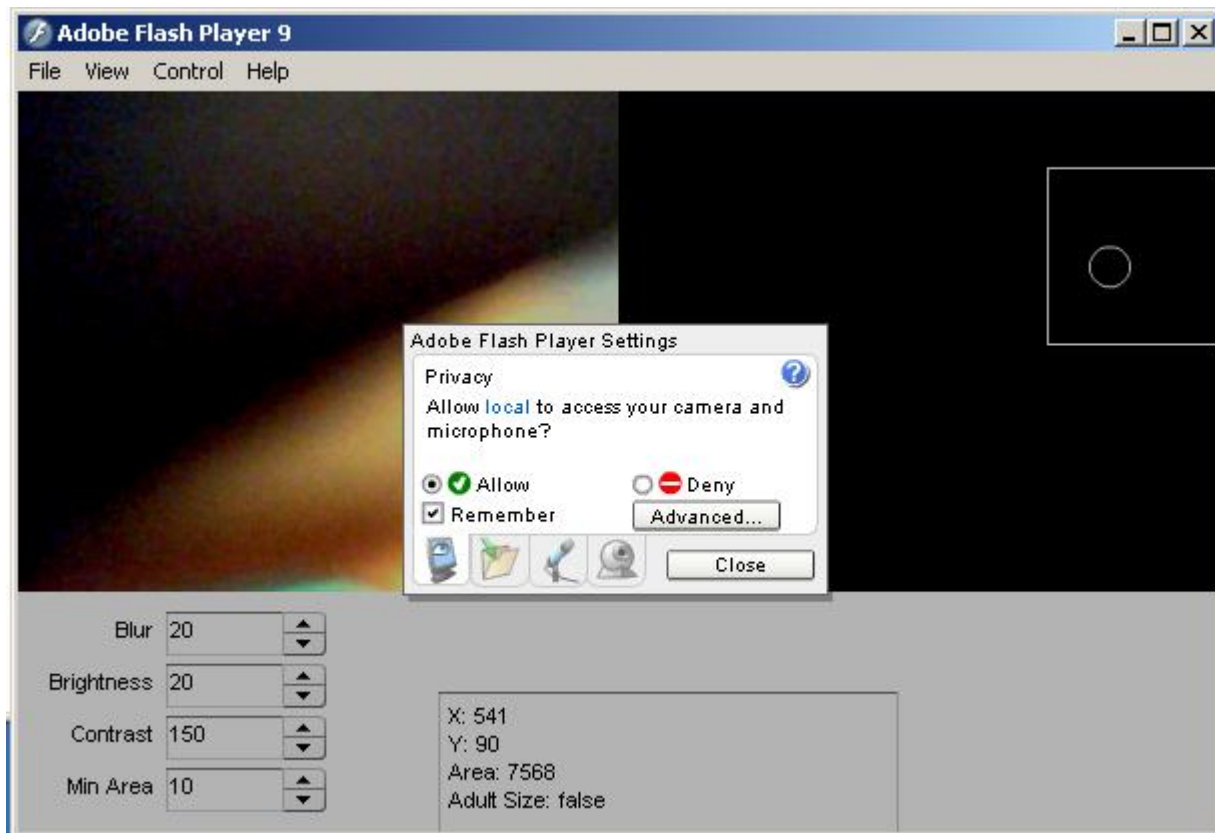
3.4 Flash Player setup.

Make sure the webcam drivers are installed and the webcam is plugged in.

There are 4 folders in the "Otago Museum Virtual Ants June 2009" folder. Go to the folder called "Webcam Setup Program". Double click the "Motion-Tracking setup.swf" file. This will prompt an Adobe Flash Player Settings window to pop up. We want Flash Player to always allow the webcam to connect without being prompted by this message. Right click on the message window and a list of options will appear, select Settings. See image below.



In the next window, check Allow and Remember, and then click Close. See image below.
You are now finished with this part.



3.5 The Motion-Tracking setup.swf program.

The Motion Tracking program now displayed is made up of 3 main areas. The top left window shows what the webcam is seeing, called the webcam view. The top right window displays any motion picked up on the left screen, as white blobs with a white square box around all the blobs. The lower half of the window is for adjustments and output of information, this can be ignored.

With the projector and the Motion Tracking program going, the idea is to have the left and right sides of the webcam view the touching the sides of the image the projector is displaying on the floor. Look at the image below.



This shows a screen shot of what the projector is seeing. The area with thick white strips, top and bottom is what the webcam is seeing. Align the top edge of the webcam view with the top edge of the projected image on the floor. Resizing the area the webcam sees, is done by adjusting the focus ring on the webcam. It will usually blur the image slightly, but this is not a problem. In fact it can help with preventing the motion detection being overly sensitive. Do not worry about the excess area covered by the webcam on the lower part that is not being displayed by the projector. When the Virtual Ants program is running, the top of the screen is where the ant nest is.

For further fine tuning of the position of the webcam, start the Flash movie, Virtual Ants, in the "Virtual Ants with Tracking Circle" folder. See section 5 below for a more detailed explanation.

3.6 Install the Virtual Ants program.

Just place the "Virtual Ants" folder in the C: drive. There isn't an installer to run, unlike most programs. If you do not put it in the C: drive, it will not start automatically.

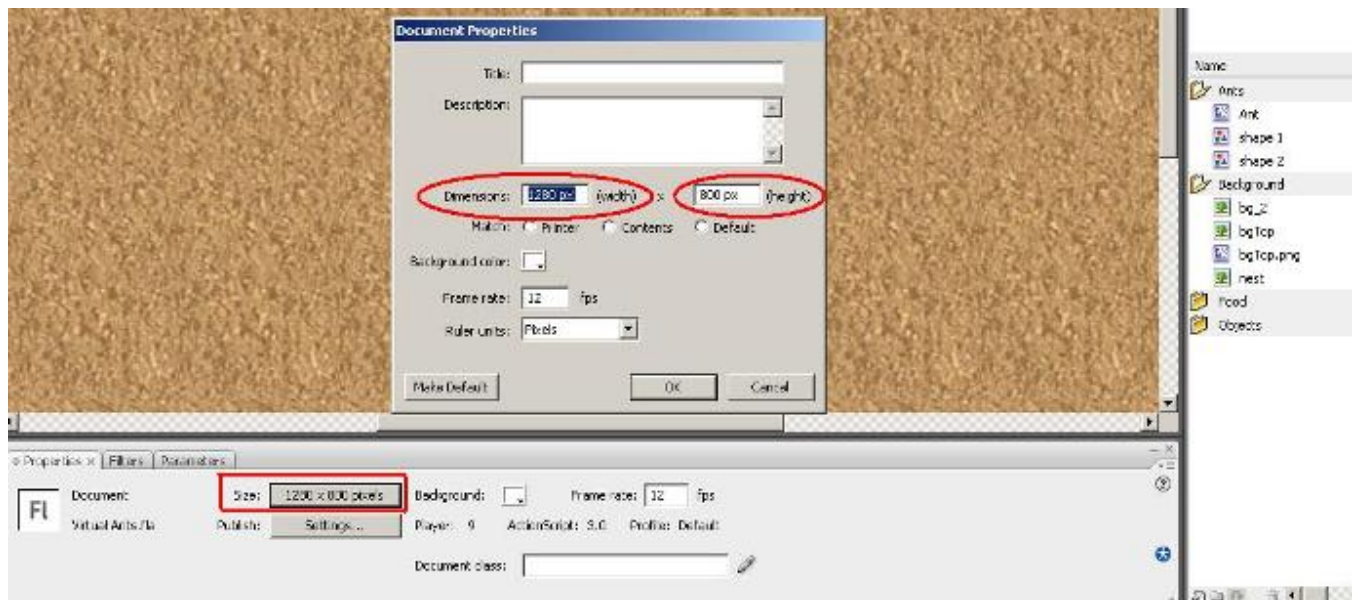
3.7 Set the Virtual Ants program to start automatically.

Place the "Virtual Ants Startup.bat" file into the Windows Startup folder. This will start the "Virtual Ants" program when Windows starts. Now whenever you start Windows, the Virtual Ants program will start automatically as well.

4.0 Need to change the resolution?

If you do not have a widescreen projector, you will have to change the resolution the Virtual Ants program displays at.

You will need to open up the "Virtual Ants.fla" file in Adobe Flash CS3 or later. Click the Size button located in the lower part of the screen. This will bring up a window to allow you to change the displayed size of the Virtual Ants program. Change the "Dimensions", "width" and "height" as required. See image below.



Click OK when done. Now you have to save the changes by going Edit, Save or you can use the keyboard shortcut, "Ctrl + S". Next you must recompile the program by going "CTRL+ENTER".

Next you will have to reset the webcam view again to suit. You should be ready to go.

5.0 What are in the other folders?

Of the 4 folders in the "Otago Museum Virtual Ants June 2009" folder, three are basically the same except for some display changes.

1. The "Virtual Ants" does not have any stones, twigs and leaves displaying on the floor. This is version installed in the Otago Museum.
2. The "Virtual Ants withObjects" has stones, twigs and leaves displaying on the floor.
3. The "Virtual Ants with Tracking Circle" has a circle that indicates the centre of any motion detected. This can be used for fine tuning the position of the webcam. It requires a person to interact with the running program moving around trying to get the tracking circle to follow as close as possible to them. This person gives directions to another person up with the projector and webcam to adjust the webcam position as required. This is a very trial and error type of exercise but can be useful for fine adjustment.
4. The "Webcam Setup program" folder contains the Motion-Tracking setup.swf file.